(12) UK Patent Application (19) GB (11) 2 195 841 (13) A

(43) Application published 13 Apr 1988

(21) Application No 8722644

(22) Date of filing 25 Sep 1987

(30) Priority data
(31) 61/147986 (32) 25 Sep 1986 (33) JP

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(51) INT CL⁴
H01R 13/639

(52) Domestic classification (Edition J):
H2E CCD
U1S 2203 H2E

(56) Documents cited
GB A 2010025
GB 1568210
GB 1113173
GB 0814440
GB 0529926
GB 0189538
EP A1 0105810

(58) Field of search
H2E

(54) Electrical connector for aerial

(57) The connecting structure has a connecting sleeve (21b) rigidly connected to the aerial (21) and removably connectable to a ring (2) in a bayonet manner (push and twist). The ring (2) is mountable on a piece of electronic equipment (6) by screws (3). In order to prevent the connecting sleeve (21b) and the ring (2) from twisting apart accidentally, a locking mechanism in the form of a spring-biased slide lock (21d) is provided that must be retracted manually, by pushing on a knob (21e) in direction B, before the two components can be twisted and then pulled apart. Alternatively (Fig. 8), the locking mechanism may comprise a pawl (22a) that snaps into a recess (23a) formed in the ring (2) and is releasable by pivoting (push in direction 24).

FIG. 1

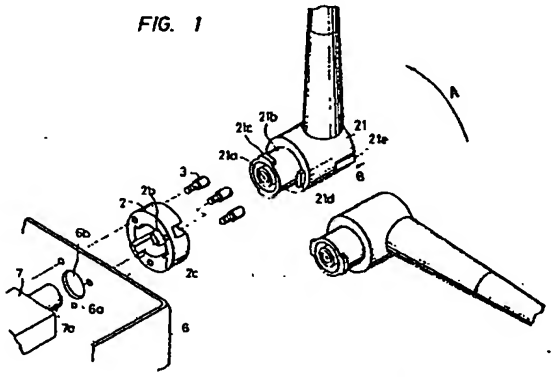
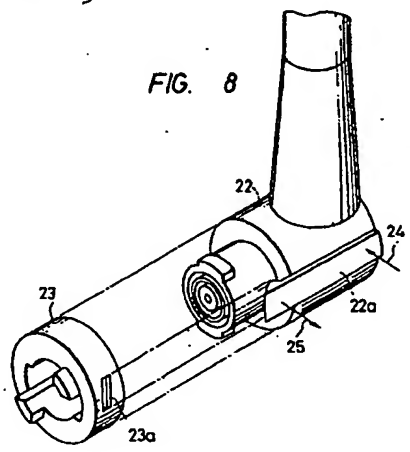


FIG. 8



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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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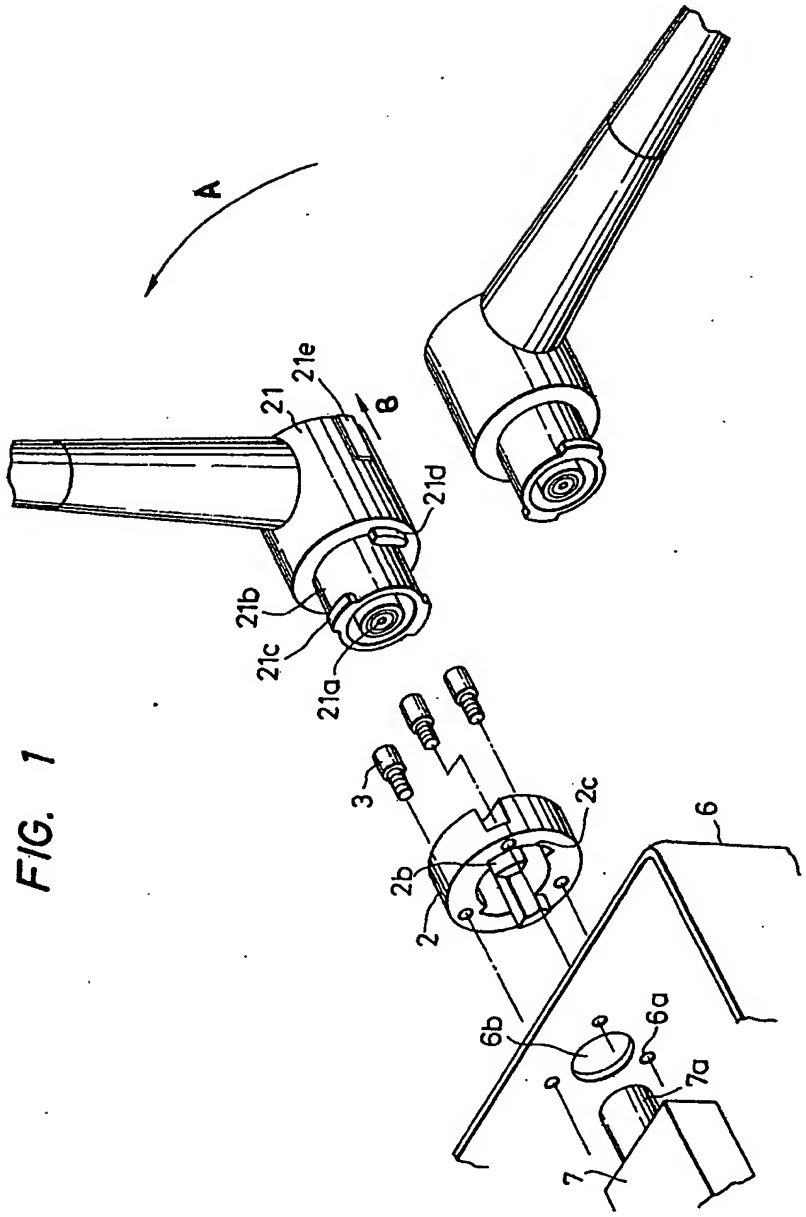

FIG. 1

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FIG. 2

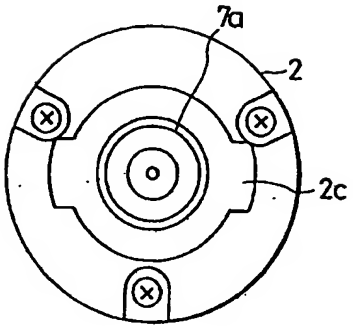

FIG. 3

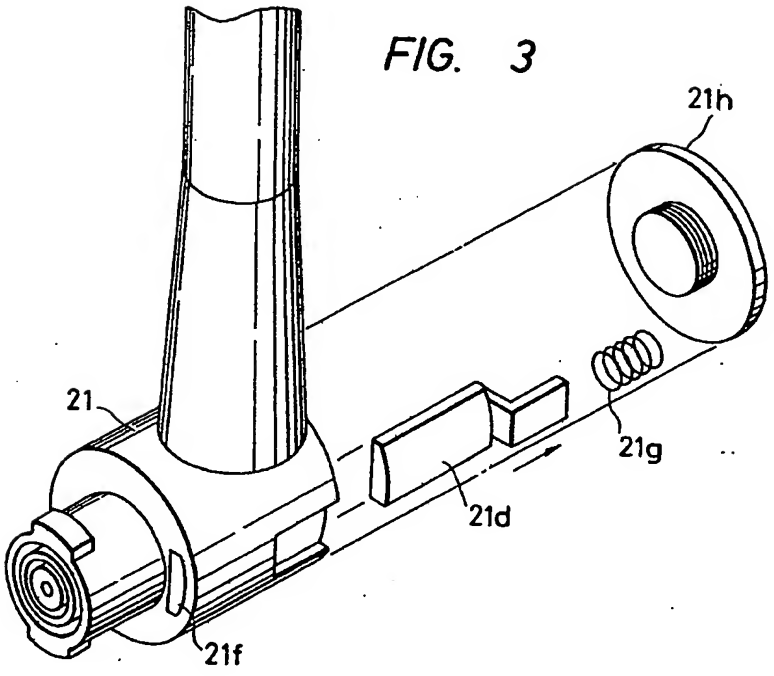

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FIG. 4

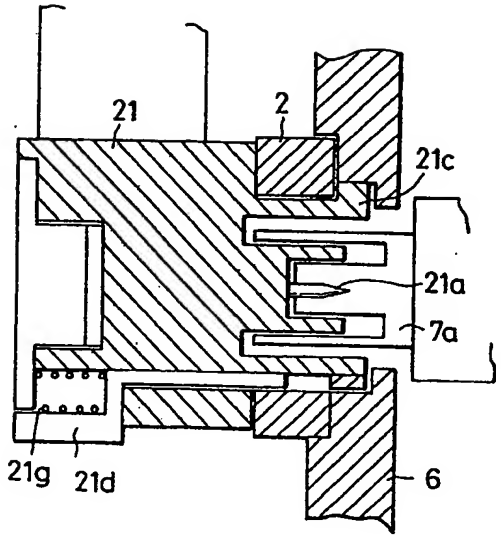

FIG. 6

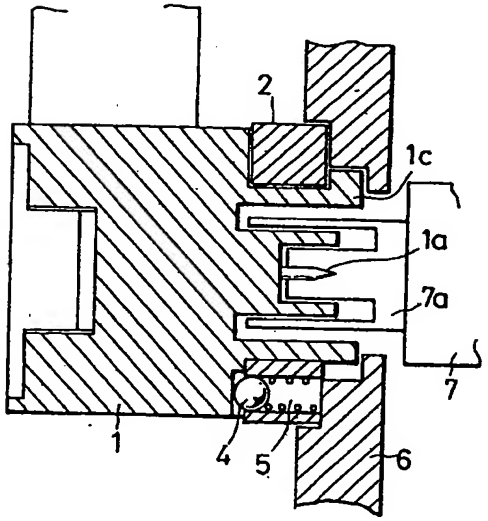

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FIG. 5

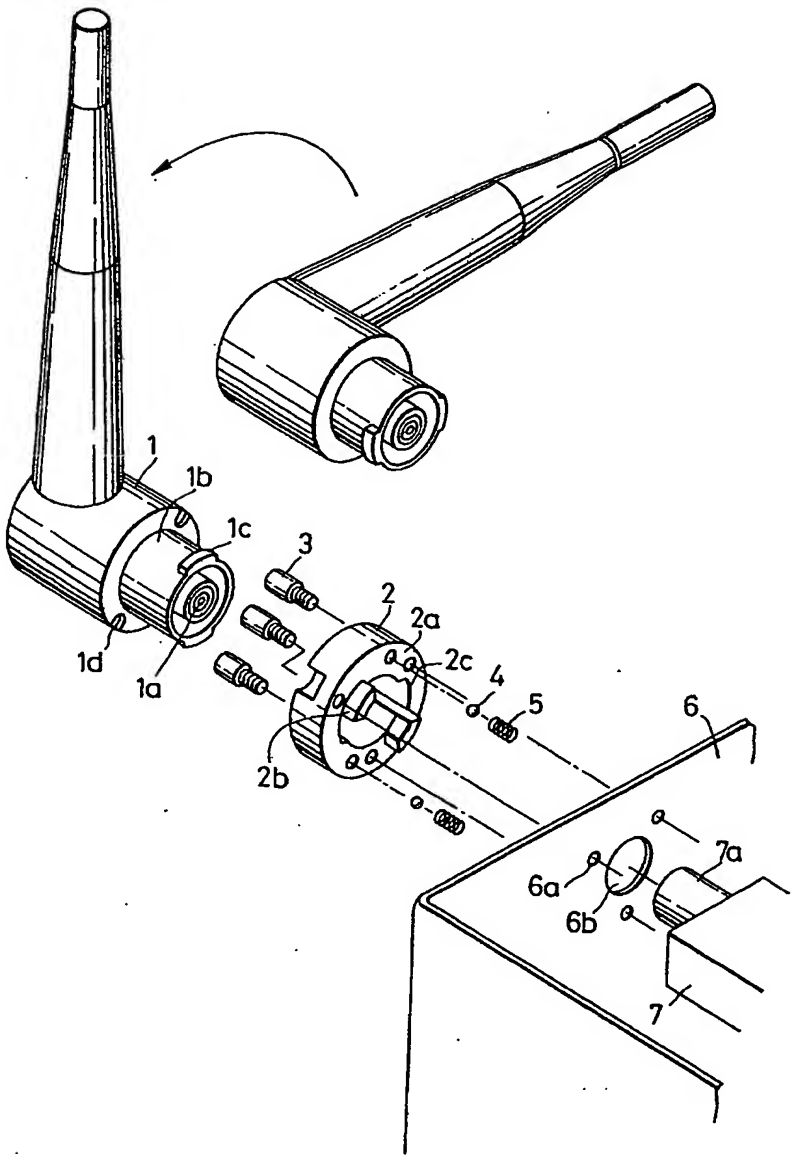

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FIG. 7

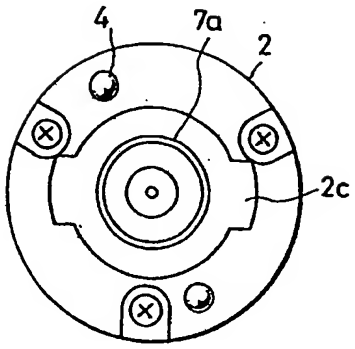
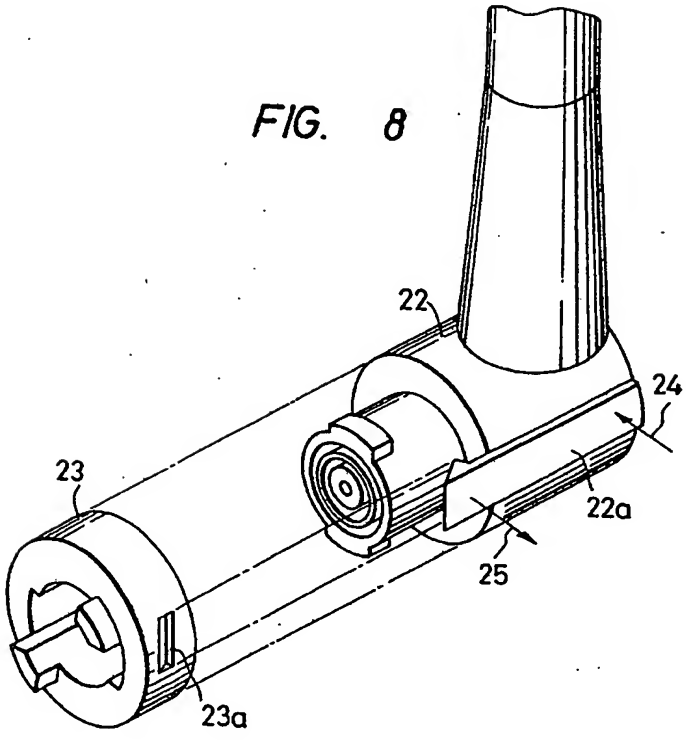


FIG. 8



SPECIFICATION

Connecting structure for an antenna

The present invention relates to a structure for detachably connecting an antenna to electronic equipment.

A conventional connecting structure for an antenna is shown in Figs. 5, 6 and 7 of the accompanying drawings.

Referring to Figs 5 to 7, an antenna 1 is connected to a connecting pin 1a for connection to a connector of a piece of electronic equipment. A cylindrical connecting sleeve 1b surrounds the pin 1a and has engaging pieces 1c. The antenna 1 also has locking grooves 1d. A ring, through which the sleeve 1b is inserted, has round through holes 2a, each containing a bearing ball 9 and a helical spring 5, and stationary pieces 2b for stopping the rotary motion of the engaging pieces 1c after they have passed along cutouts 2c. Screws 3 clamp the ring 2 onto a chassis 6 by screwing into threaded holes 6a. The chassis 6 has a round through hole 6b through which projects a coaxial connector 7a integral with a filter 7 mounted in the electronic equipment.

Operation of the connecting structure will now be described. The coaxial connector 7a of the filter 7 is inserted through the hole 6b to attach the filter 7 to the chassis 6. The bearing balls 9 and the helical springs 5 are introduced into the holes 2b of the ring 2, and the ring 2 is then clamped with the screws 3 onto the chassis 6.

The engaging pieces 1c formed on the sleeve 1b of the antenna 1 are inserted into the cutouts 2c of the ring 2, and the antenna 1 is then pushed into the ring. Thus, the connecting pin 1a of the antenna 1 becomes connected to the coaxial connector 7a of the filter 7. The antenna 1 is rotated in the direction of the arrow shown in Fig.5 until the engaging pieces 1c abut against the stationary pieces 2b. The balls 4, pressed by the helical springs 5, then enter the locking grooves 1d to complete the fixing of the antenna 1 to the electronic equipment.

To remove the antenna 1, the antenna 1 is rotated in the opposite direction with a force sufficient to force the balls 4 out of the locking grooves 1d of the antenna 1. The antenna 1 is then pulled out.

Since the conventional connecting structure for an antenna is constructed as described above, the antenna can be easily attached to and detached from the electronic equipment, but, since the antenna is rotatably held by only the balls and the helical springs, the torque required to unlock the antenna is small. If a frictional coefficient is increased or the spring force is increased so as to increase the unlocking torque, the balls and springs become worn or damaged, and the antenna is then easily unlocked accidentally.

It is an object of the present invention to prevent the antenna from being unlocked accidentally.

According to the present invention, a connecting structure for an antenna comprises a connecting pin with a surrounding connecting sleeve to be carried by the base end of the antenna; at least one engaging piece projecting outwards from the outer periphery of the connecting sleeve; an attachment for mounting on the electronic equipment and arranged to receive the connecting sleeve moving axially and then rotatably through a predetermined angle to a latching position at which the engaging piece prevents axial movement of the connecting sleeve relatively to the attachment and a locking mechanism locks to prevent reverse rotation of the connecting sleeve, a part of the locking mechanism being manually displaceable before reverse rotation of the connecting sleeve may occur. In this way the connecting structure can resist high axial and rotary forces trying to disconnect the connecting sleeve and antenna from the mounting attachment. Such disconnection can occur only after the locking mechanism has been unlocked.

Preferably, the attachment is a ring having a cutout groove formed axially along its inner wall for guiding the engaging piece during the axial movement of the connecting sleeve. The attachment may have a stationary piece formed on one face in the path of the engaging piece for preventing further rotation of the connecting sleeve after it has been rotated through the predetermined angle to the latching position.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of a connecting structure in accordance with the present invention;

Fig. 2 is an end view of part of the connecting structure of Fig. 1;

Fig. 3 is an exploded view of a locking mechanism of the connecting structure of Fig. 1;

Fig. 4 is a sectional view showing the connecting structure of Fig. 1 connecting an antenna to a piece of electronic equipment;

Fig. 5 is an exploded perspective view of a conventional connecting structure;

Fig. 6 is a sectional view showing the connecting structure of Fig. 5 connecting an antenna to a piece of electronic equipment;

Fig. 7 is an end view of part of the connecting structure of Fig. 5; and,

Fig. 8 is a perspective view of a modified locking mechanism for use with a connecting structure in accordance with the present invention.

An embodiment of the present invention will now be described. In Figs. 1 to 4, a number of the components are the same as in Figs. 5

to 7 and have the same reference numerals. However, an antenna 21 has a connecting pin 21a surrounded by a cylindrical connecting sleeve 21b having engaging pieces 21c. A slide lock 21d, movable by a knob 21e, is located in a locking groove 21f and biased by a helical spring 21g. A cover 21h retains the spring 21g in place.

Operation of this connecting structure will now be described. The slide lock 21d is inserted into the locking groove 21f formed on the antenna 21, the slide lock 21d is biased by the helical spring 21g and the cover 21h is screwed onto the antenna 21. The end of the slide lock 21 is pushed by the helical spring 21g so as to project out of the antenna 21, and the end of the slide lock 21d may be retracted into the antenna 21 by pushing the slide lock 21d in the direction of the arrow in Fig. 3.

The coaxial connector 7a is inserted through the hole 6b and the filter 7 is clamped by the screws 3 to the ring 2.

The engaging pieces 21c of the antenna 21 are inserted in to the cutouts 2c of the ring 2, and the antenna 21 is then pushed into the ring 2. Thus, the connecting pin 21a of the antenna 21 becomes connected to the coaxial connector 7a of the filter 7. The slide lock 21d of the antenna 21 comes into contact with the ring 2 at this time. Then, the antenna 21 is rotated in the direction of the arrow A of Fig. 1 until the engaging pieces 21c of the antenna 21 abut against the stationary pieces 2b of the ring 2. The end of the slide lock 21d of the antenna 21 moves forwards into the cutout 2c of the ring 2 at this time to fix the antenna 21 relative to the electronic equipment.

To remove the antenna 21, the slide lock knob 21e of the antenna 21 is pushed in the direction of the arrow B of Fig. 1 to retract the slide lock 21d from the cutout 2c of the ring 2. The antenna 21 is then rotated in the reverse direction and pulled out of the ring 2.

In the embodiment described just above, the slide lock 21d projects into the cutout 2c of the ring to prevent the antenna from rotating. However, the present invention is not limited to that particular embodiment. For example, as shown in Fig. 8, a recess 23a is formed in the side of a ring 23, a pawl 22a flexible perpendicularly to its axial direction is formed on the side of an antenna 22, and the pawl 22a is engagable with the recess 23a to prevent the antenna from rotating. In the embodiment of Fig. 8, in order to release the antenna, one end of the pawl 22a is pushed in a direction 24, the other end lifts up in a direction 25 and the antenna 22 may then be rotated.

Generally, the engaging pieces prevent the antenna from being pulled out and the locking mechanism prevents the antenna from being rotated. Therefore, the antenna can be easily attached to and detached from the electronic equipment without the need for protrusions on the external surface of the electronic equipment, and provides a connecting structure able to resist very large rotary and pulling forces, all in a very compact structure.

CLAIMS

1. A connecting structure for connecting an antenna to a connector of a piece of electronic equipment, the structure comprising a connecting pin with a surrounding connecting sleeve to be carried by the base end of the antenna; at least one engaging piece projecting outwards from the outer periphery of the connecting sleeve; an attachment for mounting on the electronic equipment and arranged to receive the connecting sleeve moving axially and then rotatably through a predetermined angle to a latching position at which the engaging piece prevents axial movement of the connecting sleeve relatively to the attachment and a locking mechanism locks to prevent reverse rotation of the connecting sleeve, a part of the locking mechanism being manually displaceable before reverse rotation of the connecting sleeve may occur.

2. A connecting structure according to claim 1, wherein the attachment is a ring having a cutout groove formed axially along its inner wall for guiding the engaging piece during the axial movement of the connecting sleeve.

3. A connecting structure according to claim 2, wherein the cutout groove is also used as a locking groove of the locking mechanism.

4. A connecting structure according to claim 3, wherein the locking mechanism comprises a slide lock rotatable integrally with, but biased by a spring to slide axially relatively to, the connecting sleeve and arranged to slide, under the effect of the spring, into the cutout groove when the connecting sleeve has been rotated to the latching position, thereby to prevent reverse rotation of the connecting sleeve.

5. A connecting structure according to claim 1 or claim 2, wherein the locking mechanism comprises a pawl mounted on the connecting sleeve and arranged to engage with a recess in the attachment when the connecting sleeve has been rotated to the latching position.

6. A connecting structure according to any of the preceding claims, wherein the attachment has a stationary piece formed on one face in the path of the engaging piece for preventing further rotation of the connecting sleeve after it has been rotated through the predetermined angle to the latching position.

7. A connecting structure for connecting an antenna to a connector of a piece of electronic equipment, substantially as described with reference to the accompanying drawings.

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